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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,911	09/12/2003	Satoshi Kojima	03500.015380.1	7874

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EXAMINER	
DOTE, JANIS L	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/660,911	KOJIMA ET AL.	
	Examiner	Art Unit	
	Janis L. Dote	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/865,699.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/12/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. This is a division of copending US application 09/865,699, filed on May 29, 2001, which is now abandoned.

2. The examiner acknowledges the cancellation of claims 2, 4, and 6-7, and the amendments to claims 1, 3, and 5 filed on Sep. 12, 2003 (Amdt091203). Claims 1, 3, and 5 are pending.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

In Fig. 7, the reference sign **3202**. See pages 79-81 of the instant specification.

A replacement drawing in compliance with 37 CFR 1.121 or an amendment to the specification to add the reference sign(s) in the description, is required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The disclosure is objected to because of the following informalities:

(1) The specification in the added paragraph beginning at page 1, line 1, filed in Amdt091203, mentions the US application 09/865,699. However, the specification fails to disclose the

current status of the application.

The examiner can no longer make an informal examiner's amendment to the specification to update the status of disclosed US applications, as set forth in MPEP 1302.04, "with pen by the examiner of the application who will then initial in the margin," because the application is now an electronically imaged file wrapper (IFW).

(2) The use of trademarks, e.g., Canon [sic: CANON] at page 98, line 6, has been noted in this application. The trademarks should be capitalized wherever they appear and be accompanied by the generic terminology. This example is not exhaustive. Applicants should review the entire specification for compliance.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Appropriate correction is required.

5. The examiner notes that the following terms recited in instant claim 1 are means-plus-function limitation covered by 35 USC 112, sixth paragraph:

(1) an "image forming light irradiation means"; and

(2) a "developing means for forming an image."

Structure of said light irradiation means is found in Fig. 1. Fig. 1 shows a means for irradiating the light structure comprising a laser light source (laser diode) **100**, a light source optical system **104**, a rotative multi-way mirror **102**, and a scanning optical system **108**. See page 82, lines 8-18, of the instant specification. Structure for the developing means is found in developer **1804** in Fig. 8. See page 82, line 27, of the specification. No other structures are disclosed for performing the functions of light irradiation and developing to form an image. Those structures and equivalents thereof define the literal scope of the terms "light irradiation means" and "developing means" recited in instant claim 1.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and

distinctly claim the subject matter which applicant regards as the invention.

Claim 3 is indefinite in the phrase "aluminum grains represented by said aluminum crystal grain boundaries exposed on said supporting member have an average grain size larger than said diameter of the spot of said light beam for exposure" (emphasis added) for lack of antecedent basis for "said light beam for exposure in claim 1." It is not clear whether the term "said light beam" refers to the laser beam recited in instant claim 1 or to another component.

If the term refers to the laser beam recited in instant claim 1, claim 3 would be indefinite because it would not further limit claim 1. Claim 1 requires that the "average grain size of crystal grains represented by the crystal grain boundaries exposed on the photosensitive layer surface" be larger than the spot diameter of the laser beam. Claim 1 requires that the crystal grain boundaries on the surface layer correspond to the aluminum crystal grain boundaries.

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f), or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent 987576 (EP'576) combined with US 5,480,754 (Takei) combined with US 4,686,165 (Suda).

EP'576 discloses an image forming method that meets the steps recited in the instant claims but for the particular photoreceptor recited in the instant claims. The EP'576 method employs an electrophotographic apparatus and comprises the steps of: (1) exposing an amorphous silicon photosensitive member **1801** with a laser beam **1803** from an optical scanning device carrying information to form an electrostatic latent image, wherein the exposure step is a background exposure method (BAE) for exposing the non-image areas (background areas) to the light; and

(2) developing the latent image with a developing unit **1804**. Fig. 11, paragraphs 0214-216, and example 3 at paragraph 0233. The optical scanning device is composed of a laser diode **100**, a rotary polygon mirror **102**, a light-source optical system **104**, which guides the laser beam emitted from the laser diode **100** to the rotary polygon mirror **102**, and a scanning optical system **108** that guides the laser beam deflected by the rotary polygon mirror **102** to the photosensitive member **1801**. Fig. 1, and paragraph 0212-0213. The light-source optical system **104** is that illustrated in Fig. 4. Fig. 4, paragraphs 0007 and 0231, and example 3. The optical scanning device in Figs. 1 and 4 and developing unit **1804** meet the definitions of the "image forming light irradiation means" and "developing means" recited in instant claim 1, as discussed in paragraph 5 supra. EP'576 teaches that the spot (or dot) diameter of the laser beam on the photosensitive is not more than 60 μm. See reference claim 6 at page 23. In example 3, the spot diameter is 30 μm. Paragraph 0229, and Table 1, example 3. According to EP'576, its image forming method provides very good image resolution, dot stability, and "design latitude." See Table 1, example 3.

As discussed supra, EP'576 does not exemplify an amorphous silicon containing photoreceptor as recited in the instant claims. However, EP'576 does not limit the type of amorphous

silicon-based photosensitive member used. See paragraph 0054 and reference claim 5

Takei discloses a photoreceptor comprising an aluminum substrate and a photosensitive layer comprising amorphous silicon. The photosensitive layer comprises a charge blocking layer, a photoconductive layer, and a surface layer. The total thickness of the photosensitive layer is 23.5 μm. See experiment 3 at cols. 20-21. Takei also discloses that the surface of the aluminum substrate is subjected to a surface treatment with water. Accordingly to Takei, its photoreceptor provides high quality uniform images. Col. 5, lines 23-28. In experiment 3, images with partial white-background fogging and a "slight" number of black spots were obtained. See Table 8, for resistivity of 1 MΩ•cm.

Takei does not disclose that the surface layer of the photosensitive layer has convex portions having a height within the range of 0.05 to 0.4 μm "corresponding to the crystal grain boundaries" of the aluminum substrate as recited in instant claim 1. However Takei's aluminum substrate is surface treated by a cleaning method that is within the scope of the method recited in instant claim 3. Takei's aluminum substrate is treated with a liquid comprising a detergent dissolved into water and then treated with a carbon dioxide aqueous solution

having a conductivity of 20 μS/cm. The water resistivity used in the carbon dioxide aqueous solution has a resistivity of 1 MΩ•cm (25°C). See Table 6. Takei discloses that the water used in the detergent solution preferably has a resistivity of 1 MΩ•cm (25°C) or more. Col. 10, lines 20-22. A resistivity of 1 MΩ•cm (25°C) meets the resistivity limitation recited in instant claim 3. Takei discloses that the photoreceptor provides toned images with a small number ("slight") of black spots (fog). See Table 8. According to the instant specification at page 32, lines 3-5, when the height of the convex structure exceeds 0.4 μm, fog increases, thereby affecting the image quality. Because Takei's aluminum substrate is surface treated by a method that is within the process limitation recited instant claim 3 and because Takei's photoreceptor provides toned images with "slight" black spots, it is reasonable to presume that Takei's photoreceptor comprises the convex portions as recited in instant claim 1. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Takei does not disclose that its aluminum substrate comprises crystal grain boundaries having an average diameter of 70 μm to 300 μm as recited in instant claim 1. Takei discloses that the its aluminum substrate may be "any kind of material

. . . as far as its uses aluminum as the base." Col. 14, lines 38-39.

Suda discloses an aluminum or aluminum alloy substrate having crystal grains located in the surface of the substrate, where each of the grains have a diameter of about 1 cm at most, usually 100 μm or smaller. Col. 4, lines 58-59. Suda discloses that its aluminum or aluminum alloy substrate can be used as the substrate of an amorphous silicon photoreceptor. Col. 3, lines 3-5. According to Suda, faithful reproduction of images can be made when the crystal grain size is about 1 cm (i.e., 10000 μm) at most, usually 100 μm or smaller. Col. 4, lines 54-59. Suda exemplifies an aluminum substrate having crystal grains having a diameter of 100 μm. See Fig. 3 and col. 4, lines 38-46. The range of "about 1 cm at most" encompasses the range of 70 to 300 μm recited in instant claim 1. Suda discloses a method of making its aluminum or aluminum alloy substrate to reduce the size of the crystal grains to have the above desired crystal grain size. Col. 4, line 60, to col. 5, line 23. Suda discloses that its aluminum or aluminum alloy substrate can be processed, e.g., by cleaning, in the same way as conventional aluminum substrates. Col. 4, lines 46-48.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Suda, to adjust the crystal grain size of an aluminum or aluminum alloy substrate, through routine experimentation, such that the aluminum or aluminum alloy substrate comprises surface crystal grains where each of the grains have a diameter in the range of 70 to 300 μm, as recited in instant claim 1, and to use the resultant substrate in the photoreceptor disclosed by Takei, wherein said substrate is surface treated by the cleaning method disclosed by Takei, because that person would have had a reasonable expectation of successfully obtaining an amorphous silicon photoreceptor having the benefits disclosed by Takei and Suda. It would also have been obvious for that person to use the resultant photoreceptor rendered obvious over the combined teachings of Takei and Suda in the image forming method taught by EP'576, because that person would have had a reasonable expectation of successfully obtaining an image forming method that provides high quality images with good resolution and faithful reproduction of the images to be copied, as taught by Takei and Suda.

As discussed supra, EP'576 teaches that the spot diameter of the laser beam is 30 μm in example 3. Suda exemplifies an aluminum substrate having crystal grains having a diameter of

100 μm. Thus, the combined teachings of the references meet the process limitations that the spot diameter of the laser beam be smaller than the average grain size of the crystal grains represented by the crystal grain boundaries exposed on the photosensitive layer surface as recited in instant claim 1, and the average grain size of the aluminum grains represented by the crystal grain boundaries exposed on the aluminum substrate.

11. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP'576 combined with Takei Japanese Patent 2000-047413 (JP'413). See the DERWENT machine-assisted translation of JP'413 for cites.

EP'576 discloses an image forming method as described in paragraph 10 above, which is incorporated herein by reference.

As discussed supra, EP'576 does not exemplify an amorphous silicon containing photoreceptor as recited in the instant claims. However, EP'576 does not limit the type of amorphous silicon-based photosensitive member used. See paragraph 0054 and reference claim 5

Takei discloses a photoreceptor comprising an aluminum substrate and a photosensitive layer comprising amorphous silicon. The discussion of Takei in paragraph 10 is incorporated herein by reference.

Takei does not disclose that its aluminum substrate comprises crystal grain boundaries having an average diameter of 70 μm to 300 μm as recited in instant claim 1. Takei discloses that the its aluminum substrate may be "any kind of material . . . as far as its uses aluminum as the base." Col. 14, lines 38-39. JP'413 discloses an aluminum alloy substrate having crystal grains located in the surface of the substrate, where the grains have an average grain size (i.e., diameter) of 0.1 mm or more and less than 2 mm, preferably of 0.2 mm or more and less than 2 mm. Paragraphs 0017-0018. The diameters of 0.1 mm and 0.2 mm (i.e., 100 and 200 μm) are within the range of 70 to 300 μm recited in instant claim 1. JP'413 discloses that its aluminum alloy substrate can be used as the substrate of an amorphous silicon photoreceptor. Paragraph 0015. According to JP'413, its aluminum alloy substrate has a "high dimensional accuracy [that] is obtained by cutting" and reduces the effects of substrate heat deformation and "film forming deformation" of the photoreceptor that occur during the formation of amorphous silicon photoreceptor. Paragraphs 0007 and 0010. The aluminum alloy substrate provides a lightweight and highly durable amorphous silicon photoreceptor that may be used in high-speed copying and high-speed printing. Paragraph 0010. JP'413 discloses that an amorphous silicon photoreceptor comprising its

aluminum alloy substrate provides a "high-resolution image without a density nonuniformity." Paragraph 0039.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'413, to use the JP'413 aluminum alloy substrate comprising surface crystal grains where the grains have an average grain size of 200 μm as the substrate in the photoreceptor disclosed by Takei, wherein said aluminum alloy substrate is surface treated by the cleaning method disclosed by Takei, because that person would have had a reasonable expectation of successfully obtaining an amorphous silicon photoreceptor having the benefits disclosed by Takei and JP'413. It would also have been obvious for that person to use the resultant photoreceptor rendered obvious over the combined teachings of Takei and JP'413 in the image forming method taught by EP'576, because that person would have had a reasonable expectation of successfully obtaining an image forming method that provides high quality images with high-resolution "without a density nonuniformity."

As discussed supra, EP'576 teaches that the spot diameter of the laser beam is 30 μm in example 3. JP'413 teaches an aluminum substrate having crystal grains having a diameter of 200 μm. Thus, the combined teachings of the references meet the process limitations that the spot diameter of the laser beam be

smaller than the average grain size of the crystal grains represented by the crystal grain boundaries exposed on the photosensitive layer surface as recited in instant claim 1, and the average grain size of the aluminum grains represented by the crystal grain boundaries exposed on the aluminum substrate.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The central fax phone number is (703) 872-9306.

Any inquiry of papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER
GROUP 1500
1700

JLD
Apr. 4, 2004